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Landslide Risk Assessment in India

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Why in News: a satellite based study of the 147 most vulnerable districts by the National Remote Sensing Centre (NRSC) has found, reiterating that the western Himalayan region is most vulnerable to landslides.

A brief about NRSC study

For the first time, NRSC scientists did risk assessment on the basis of 80,933 landslides recorded between 1988 and 2022 in 147 districts in 17 states and two union territories to build a Landslide Atlas of India.

The risk analysis was based on human and livestock population density, which indicates the impact these landslides have on people, and shows the most landslide vulnerable spots in the country.

The atlas used satellite data of ISRO to map all seasonal and event-based landslides like the Kedarnath disaster in 2013 and landslides triggered due to Sikkim earthquake in 2011.

Major Highlights of the study

As per the study, India is the third most landslide prone countries in the world, where every year the loss of lives per 100 sq km due to landslides is more than one, the study said. The other countries are Colombia, Tajikistan and Nepal

Approximately 0.42 million sq km, or 12.6% of India's land area, excluding snow covered area, is prone to landslide hazard

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Of this, out 0.18 million sq km falls in North East Himalaya, including Darjeeling and Sikkim Himalaya; 0.14 million sq km in North West Himalaya (Uttarakhand, Himachal Pradesh and Jammu & Kashmir); 0.09 million sqkm in Western Ghats and Konkan hills (Tamil Nadu, Kerala, Karnataka, Goa and Maharashtra) and 0.01 million sqkm in Eastern Ghats of Aruku area in Andhra Pradesh.

The study recorded 80,933 landslide hot spots between 2000 and 2022, with the maximum of 12,385 in Mizoram, followed by 11,219 in Uttarakhand, 7,280 in Jammu and Kashmir and 1,561 in Himachal Pradesh.

Among the southern states, the most number of landslide hot spots have been recorded in Kerala (6,039).

Using satellite data, the National Remote Sensing Authority had also recorded total landslides in states between 2010 and 2022, with Uttarakhand recording the maximum landslides in this period.

Among the 10 most landslide prone districts, four are in flood prone areas of Kerala, two in Jammu and Kashmir and two in Sikkim. In fact, after the Himalayas, the Western Ghats, which has seen large-scale development in the past few years, has high landslide density.

Within the state of Uttarkhand, Rudraprayag and Tehri districts recorded the highest number of landslides

Eight other districts among the top 10 worst affected districts were Thrissur in Kerala, Rajouri in Jammu & Kashmir, Palakkad in Kerala, Poonch in Jammu and Kashmir, Malappuram in Kerala, south and eastern districts of Sikkim and Kozhikode in Kerala. As many as 64 districts of the northeast figured in the list of 147 districts.

The study said a major part of the Himalayan region is susceptible to landslides. It is the high population density, major pilgrimage routes and tourism spots that have worsened the impact of disasters in Jammu and Kashmir,

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Himachal Pradesh and Uttarakhand.

Uttarakhand alone reported over 7,750 extreme rainfall events and cloud bursts since 2015, most being in the past three years, killing over 230 people, it said.

Reason for landslides

As per the study, In India, landslides mostly occur in the monsoon season. Himalayas and Western Ghats are highly susceptible to mass movements due to hilly topography and heavy rainfall

The main reason for landslides in Rudraprayag and Tehri district is the use of dynamite for blowing up rocks, as it creates fissures in the mountains

Many slopes in these two districts are already laden with old landslide material and they are unstable and vulnerable to fresh landslides

The another main causes of landslides in Rudraprayag district is the irresponsible approach of cut and dump for road cutting, which are making many slopes unstable

The landslide risk has intensified over the years due to environmental degradation and extreme weather events such as high intensity rainfall, which have increased due to climate change.

In recent years, we have seen unplanned development in the hills of Himalaya and in Western Ghats, with scant regard for environment and forests.

The impact of it, coupled with extreme rainfall, is visible through the rising number of major landslides and land subsidence incidents being reported from Joshimath to Doda to Darjeeling

Impact of Land slides

Landslides are the third biggest natural disasters in the world, with India experiencing the biggest bulk of them — 15% of the country is prone to landslides and India has the highest number of landslide deaths in the world.

Widespread devastation, numerous road crashes and deaths caused by landslides in several parts of the country throughout the year have turned the spotlight on the urgent need for its early detection or monitoring systems.

The way ahead

Several groups of researchers in the country are working upon solutions to reduce landslide-induced fatalities by providing early and accurate warnings so that traffic can be stopped on certain routes and the people are relocated to safer places on time.